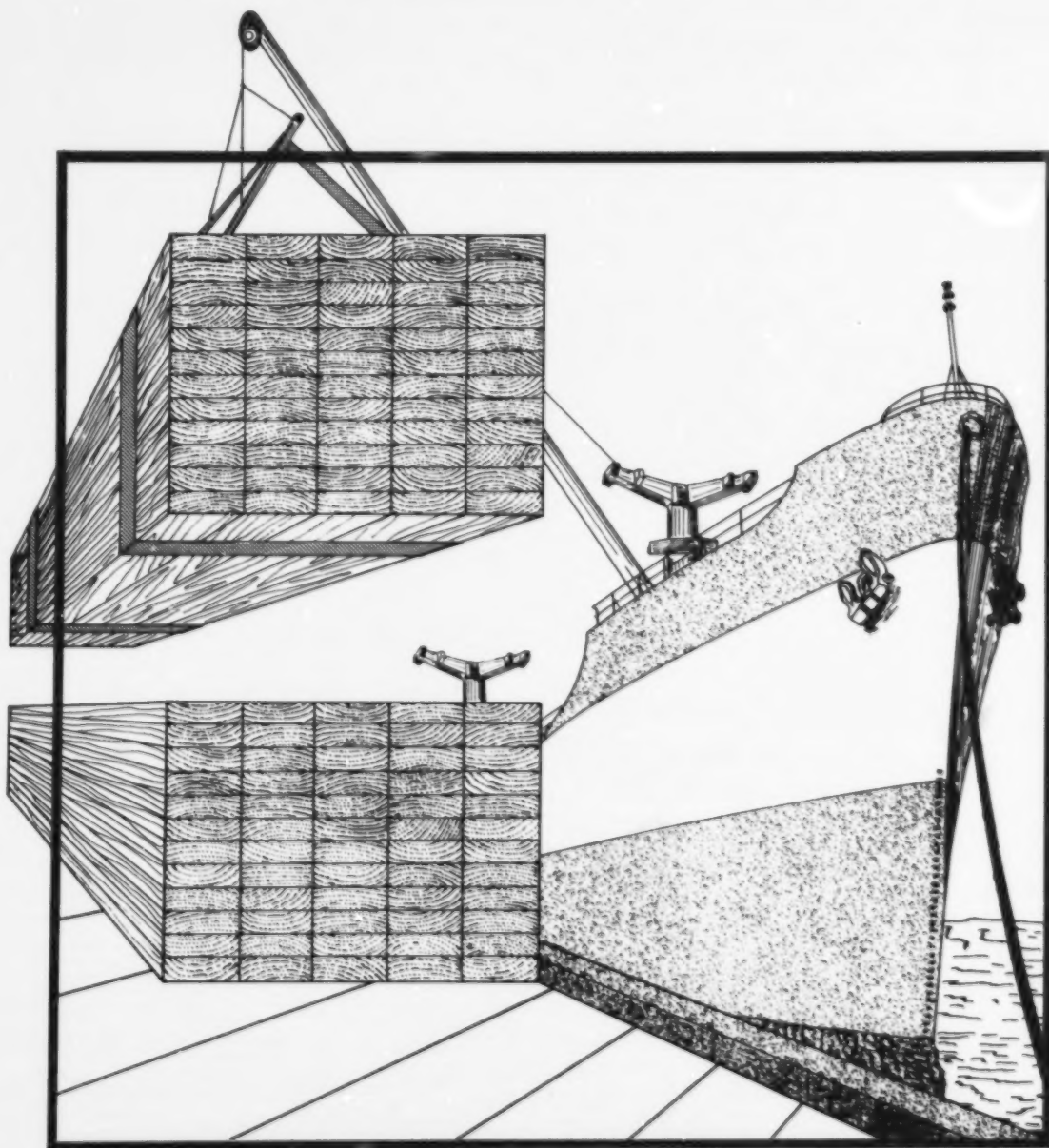




Forintek
Canada
Corp.

New Fungicidal Formulations Protect Canadian Lumber



Special Publication No. SP-25

NEW FUNGICIDAL FORMULATIONS PROTECT
CANADIAN LUMBER

by

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This publication reports research involving pesticides. All pesticides must be registered under the Pest Control Products Act in Canada before they can be used commercially. The report does not constitute an endorsement by Forintek Canada Corp. of any specific product.

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INTRODUCTION

The selection of new sapstain and mould preventive formulations is urgent and critical to maintain Canada's excellent reputation as a producer of quality lumber.

For more than a half a century the Canadian lumber industry has depended upon sodium salts of chlorinated phenols to protect lumber against fungal deterioration. However, the recent shortage of chlorinated phenols (CP) together with the environmental concerns surrounding their dioxin impurities suggests that soon other fungicides will be needed to replace CP.

Since the late 1930's CP, mainly sodium pentachlorophenate (NaPCP), were used for the protection of lumber and, later, in Canada, these were largely replaced by sodium tetrachlorophenate (NaTCP). In spite of the excellent performance and low cost of these fungicides, undesirable properties, such as toxicity to most life forms, slow biodegradation, and the presence of dioxins as impurities, have raised increasing objections to the use of CP. Today, several countries have already restricted the use of these chemicals.

A development critical to B.C.'s lumber industry came in early 1985 when Reichhold Chemicals Inc., the largest North American manufacturer of CP, and the supplier of NaTCP to the Western Canadian lumber industry, closed their plant without notice. As an immediate solution Canadian formulators of stain and mould preventives began importing NaPCP and tetrachlorophenol manufactured in France. However, the urgent need for other chemicals to protect Canadian lumber was clearly indicated.

Following Reichhold's closure, Forintek Canada Corp. and the Council of Forest Industries of B.C. (COFI) organized a workshop, in late March of 1985, to discuss "Chemical Opportunities for Lumber Protection". The workshop was attended by over 60 people representing the lumber industry and lumber manufacturing associations of B.C., the International Woodworkers of America, chemical suppliers and formulators from North America and Europe, research organizations in wood protection, and the federal government departments of agriculture and environment. The meeting focused on alternatives to CP and provided a valuable exchange of information which formed the basis of test described in this report.

Following this meeting, 11 fungicidal formulations were accepted by Forintek for a test on green hem-fir and spruce-pine-fir (SPF) lumber. The choice of formulations and the concentrations used were based on past laboratory and field tests and on information provided by the chemical suppliers. The objective of the test was to compare the efficacy of these formulations with a standard chlorophenate (NaPCP) treatment prior to their possible mill trials.

RESEARCH TEAM

R.S. Smith	Research Scientist Treated Wood Dept.
A.J. Cserjesi	Research Scientist Treated Wood Dept.
A. Byrne	Scientist Treated Wood Dept.
E. Johnson	Technologist Treated Wood Dept.
J. Clark	Technologist Treated Wood Dept.

MATERIALS AND METHODS

A description of the 12 formulations tested on hem-fir and SPF lumber is provided in Table 1.

The method is described in the Forintek publication "Field Testing Fungicides on Unseasoned Lumber - Recommended Procedure." Technical Report No. 16., A.J. Cserjesi, 1980.

The lumber was evaluated after four months outdoor storage in Vancouver.

RESULTS AND DISCUSSION

Figures 1 - 12 illustrate with shaded bars the extent of fungal growth on the lumber, while the white areas indicate the protection afforded by the formulation. A comparison can be made between the results for each formulation and the standard NaTCP treatment, the latter being provided as a fold-out sheet. An overall assessment of the efficacy of each formulation can be made from the bar charts under the heading of All Fungi.

As expected, SPF lumber is more prone to attack by all types of fungi than hem-fir lumber. In this test the amount of decay observed in the hem-fir lumber control was negligible and therefore the protection against decay afforded by specific formulations could not be assessed.

The results of this test are described in detail in the Forintek report titled, "A field test of new fungicides for the protection of unseasoned hem-fir and spruce-pine-fir lumber".

CONCLUSIONS AND RECOMMENDATIONS

The following treatments showed an effectiveness equivalent to, if not better than, the NatCP treatment:

Antiblu 3739
Busan 10-30
Saptol-7
Woodgard EC
Experimental mixture

This merits their consideration for a further five months of warm storage, followed by a second evaluation.

Following the second evaluation, formulations that continue to give satisfactory protection should be considered for mill trials. In order to finalize a decision on mill trials, toxicity data and cost information are required for each formulation.

ACKNOWLEDGEMENTS

The authors thank the several chemical suppliers who contributed formulations used in this study.

We also wish to thank Mr. E. Johnson for his strong technical contribution and Ms. J. Clark for her specific contribution in developing the computer handling systems for the data.

Table 1.

Chemical Formulations Tested; Trade (code) Names, Chemical Name(s)
of Active Ingredient(s) and Chemical Supplier

Antiblu 3739
methylene bis(thiocyanate) (MBT)
2-(thiocyanomethylthio)benzothiazole (TCMTB)
Hickson's Timber Products Ltd. (England)

Arquad C 33W
trimethylcoco ammonium chloride
Akzo Chemie America (U.S.A.)

Busan 10-30
2-(thiocyanomethylthio)benzothiazole (TCMTB)
Buckman Laboratories of Canada Inc. (Canada)

Dehydroacetic acid sodium salt
sodium salt of 3-acetyl-6-methyl-2H-pyran-2,4-(3H)-dione
Eastman Chemical International Ltd. (Canada)

IWD 3822
methylene bis (thiocyanate) (MBT)
alkyldimethylbenzyl ammonium chloride
Ivon Watkins-Dow Ltd. (New Zealand)

Preventol ON extra
sodium 2-benzyl-4-chlorophenate (sodium orthyphenyl phenate)
Bayer (Canada) Inc. (Canada)

Rodewood (azaconazole)
1-((2-(2,4-dichlorophenyl)-1,3-dioxolan-2-yl)methyl-1H-1,2,4-triazole
Janssen Pharmaceutica (U.S.A.)

Saptol-7
methylene bis (thiocyanate) (MBT)
Tenneco Organics Ltd. (England)

SA 300 WD
tri-n-butyltin oxide (TBTO)
Syndel Laboratories Ltd. (Canada)

Woodgard EC
3-iodo-2-propynyl N-butyl carbamate (IPBC)
methyl benzimidazole carbamate (MBC)
Chemcraft Sadolin Inc. (Canada)

Experimental mixture*
Forintek Canada Corp. (Canada)

Commercial formulation of sodium pentachlorophenate
sodium pentachlorophenate
sodium tetrachlorophenate
Van Waters and Rogers Ltd. (Canada)

*proprietary formulation

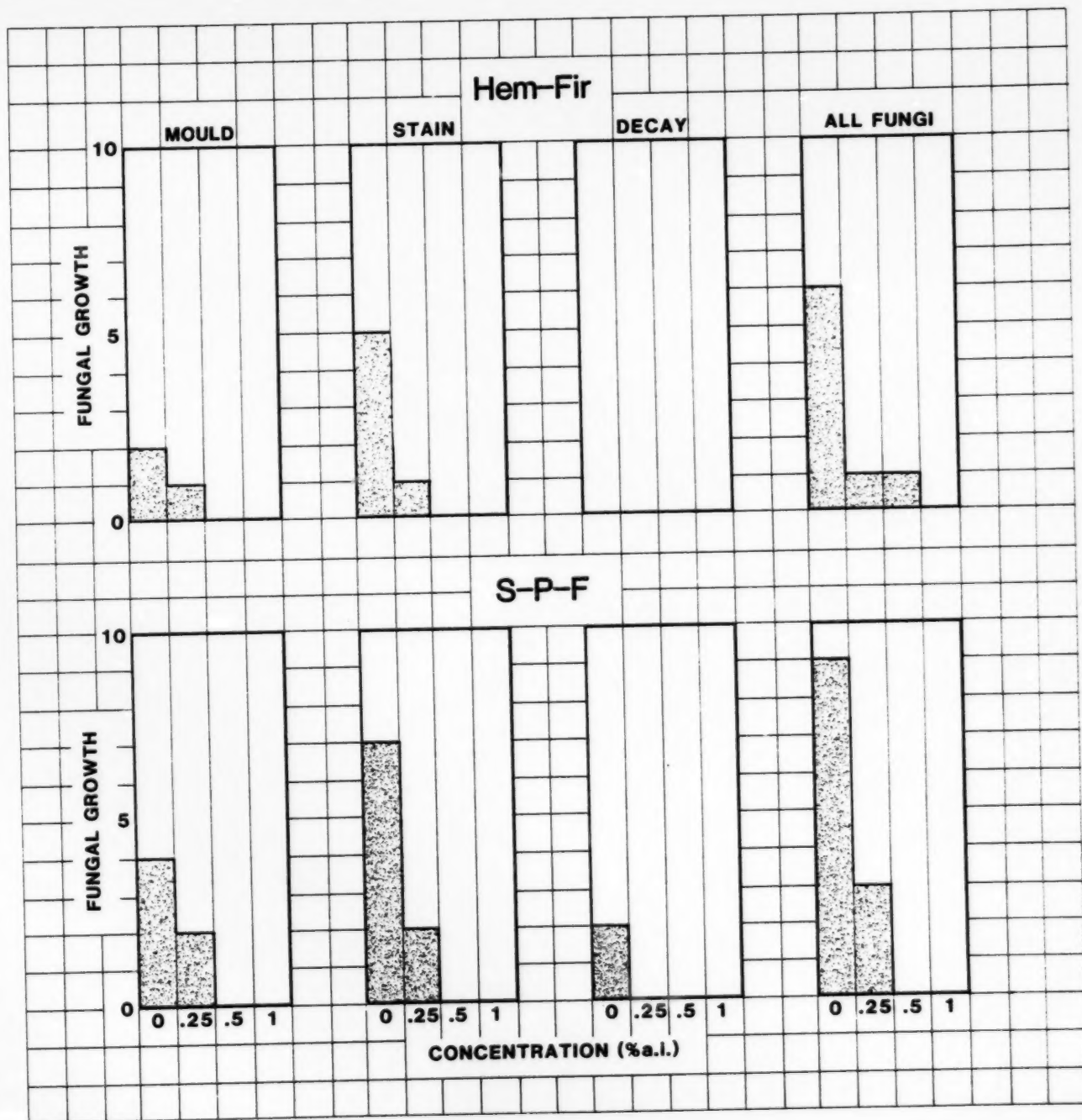
Table 2.

Treating Solution Concentrations for Each Formulation
(percent of total active ingredients--a.i.)

	Low	Medium	High
Antiblu 3739	0.25	0.5	1.0
Arquad C 33W	1.5	3.0	6.0
Busan 10-30	0.3	0.6	1.2
Dehydroacetic acid sodium salt	0.5	1.0	2.0
IWD 3822	0.38	0.75	1.5
Preventol ON extra	1.5	3.0	6.0
Rodewood	0.2	0.4	0.8
Saptol-7	0.25	0.5	1.0
SA 300 WD	0.08	0.16	0.32
Woodgard EC	0.16	0.32	0.64
Experimental mixture	1.0	2.0	4.0
Sodium pentachlorophenate	0.5	1.0	2.0

Figure 1. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

ANTIBLU 3739

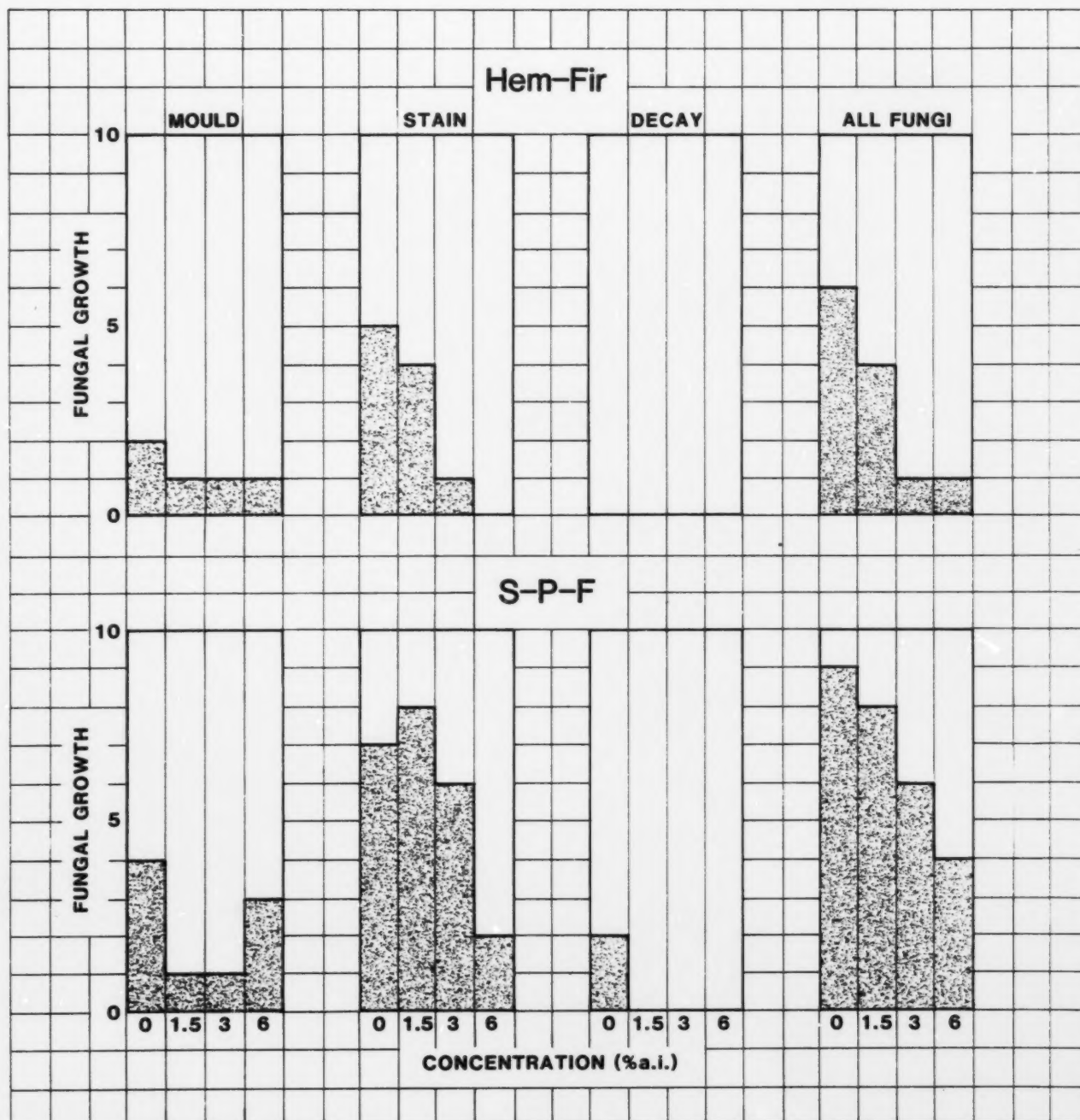


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 2. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

ARQUAD C 33W

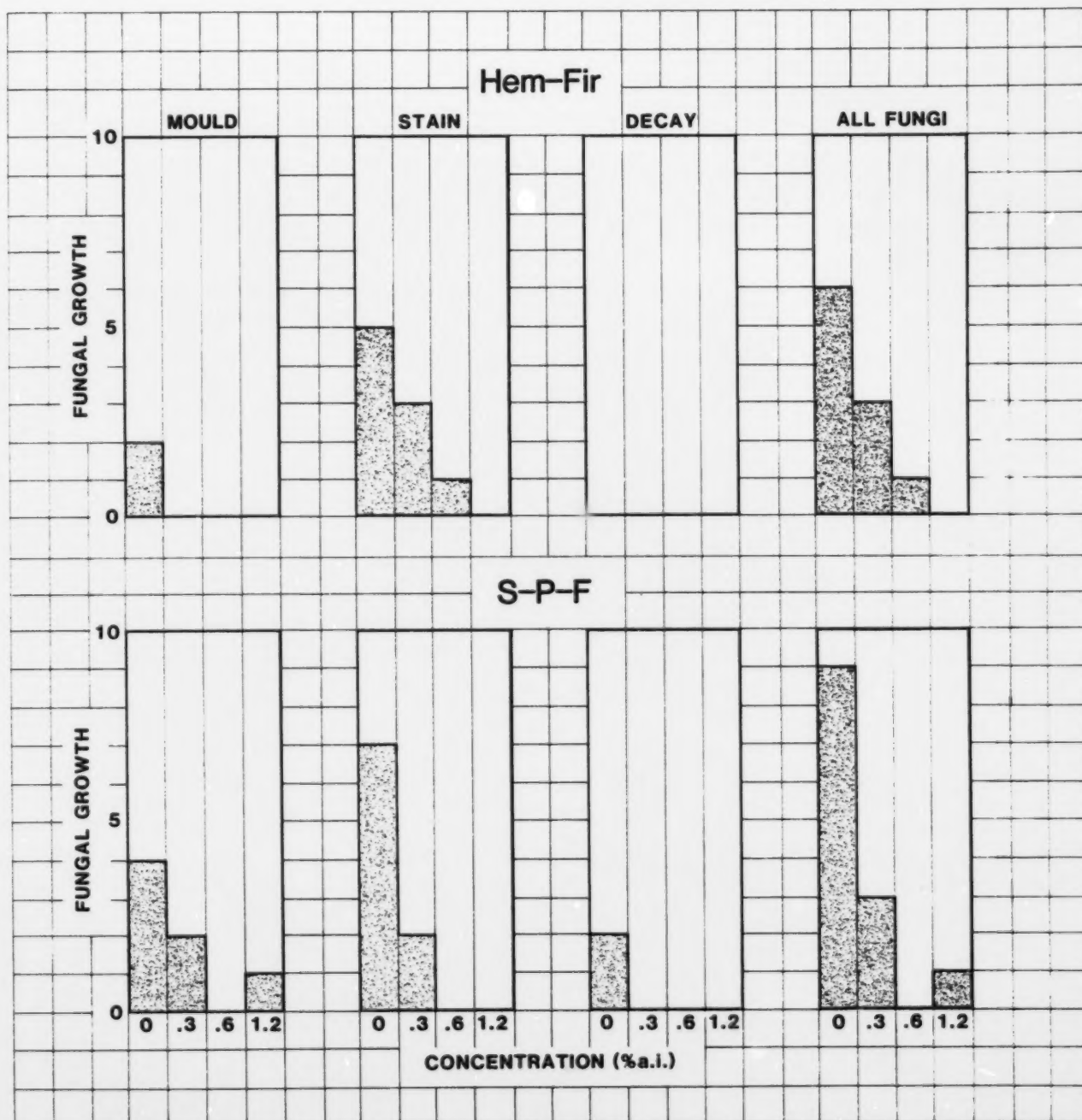


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 3. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

BUSAN 10-30

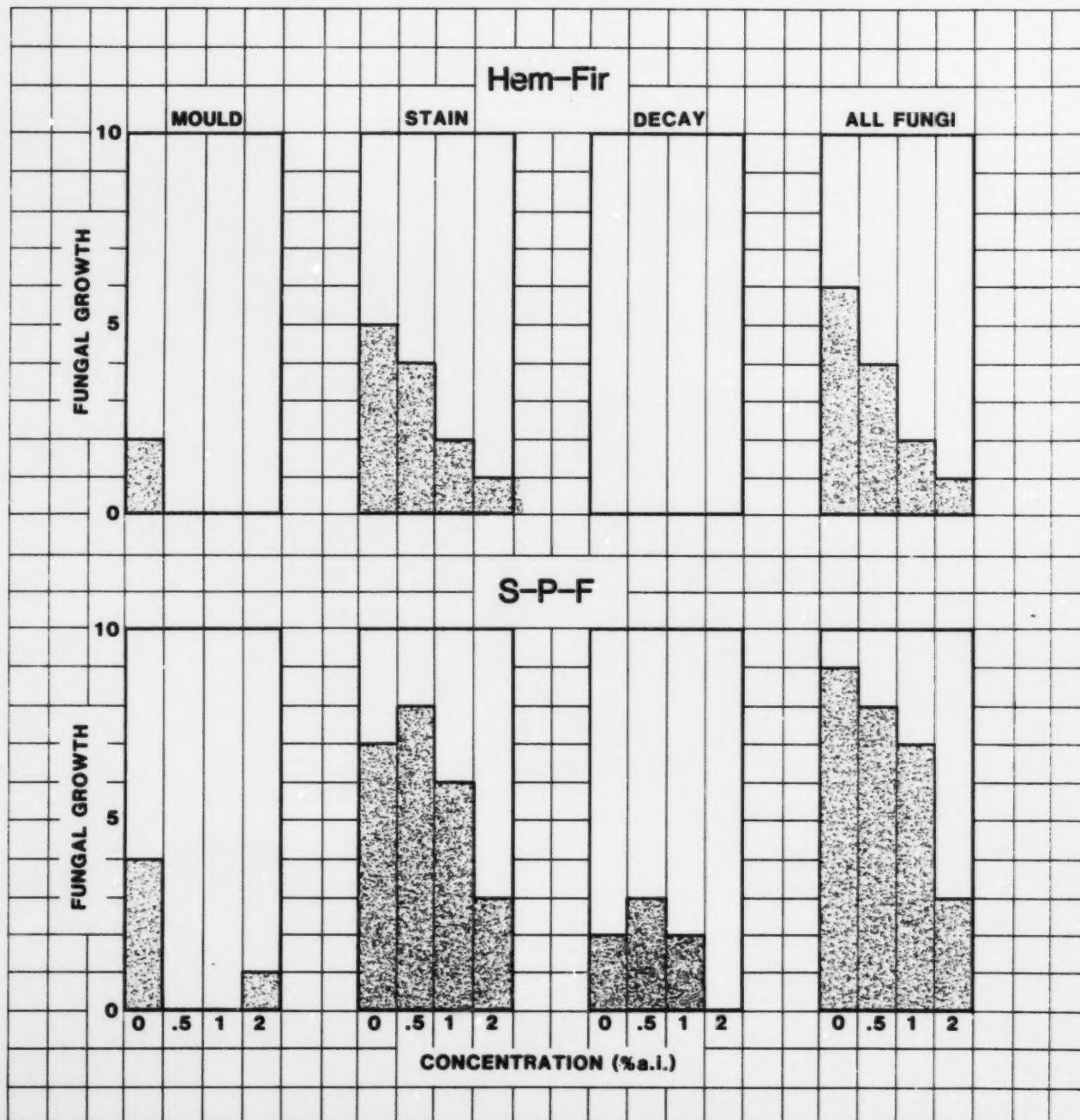


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 4. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

DEHYDROACETIC ACID, SODIUM SALT

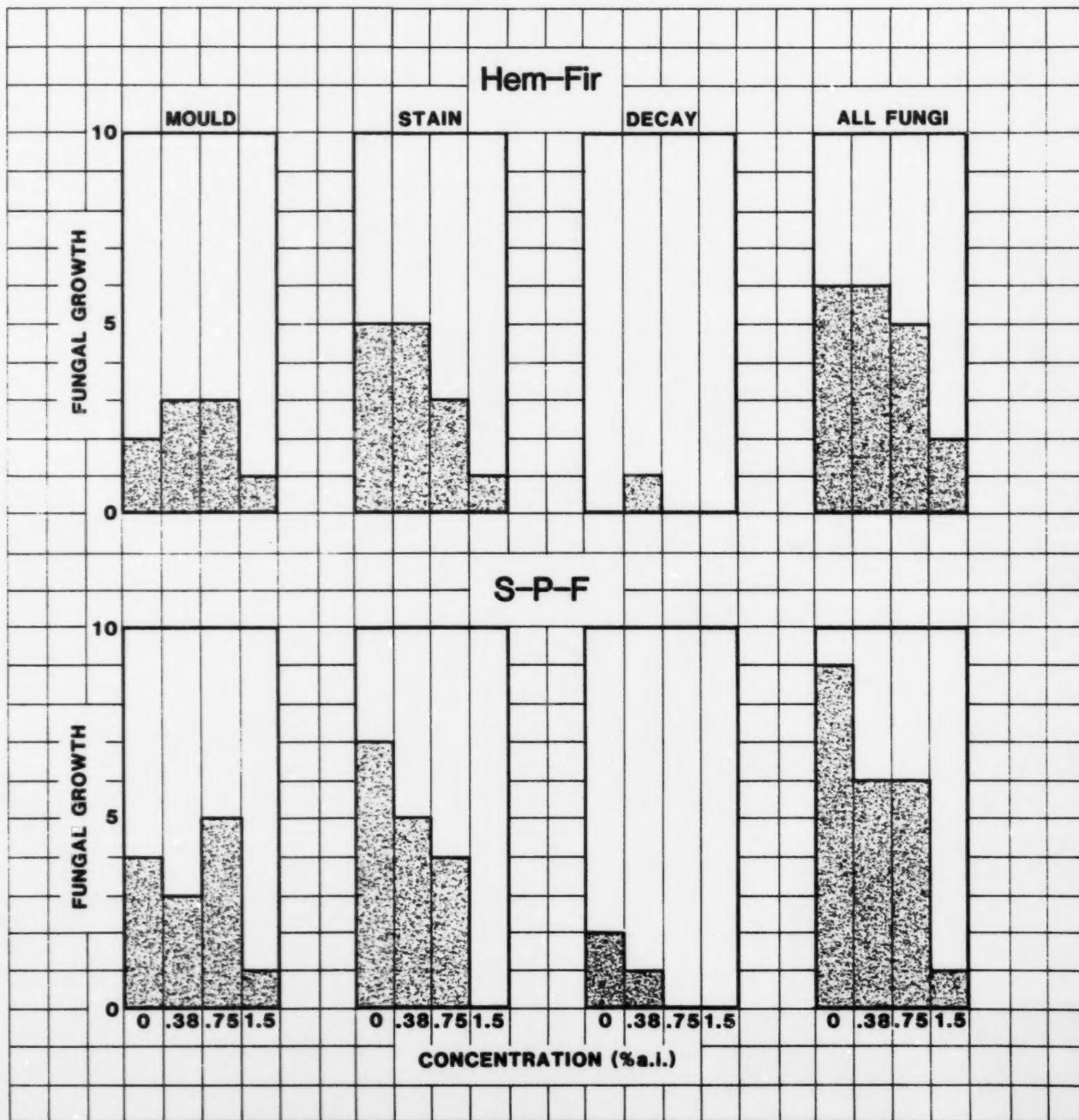


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 5. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

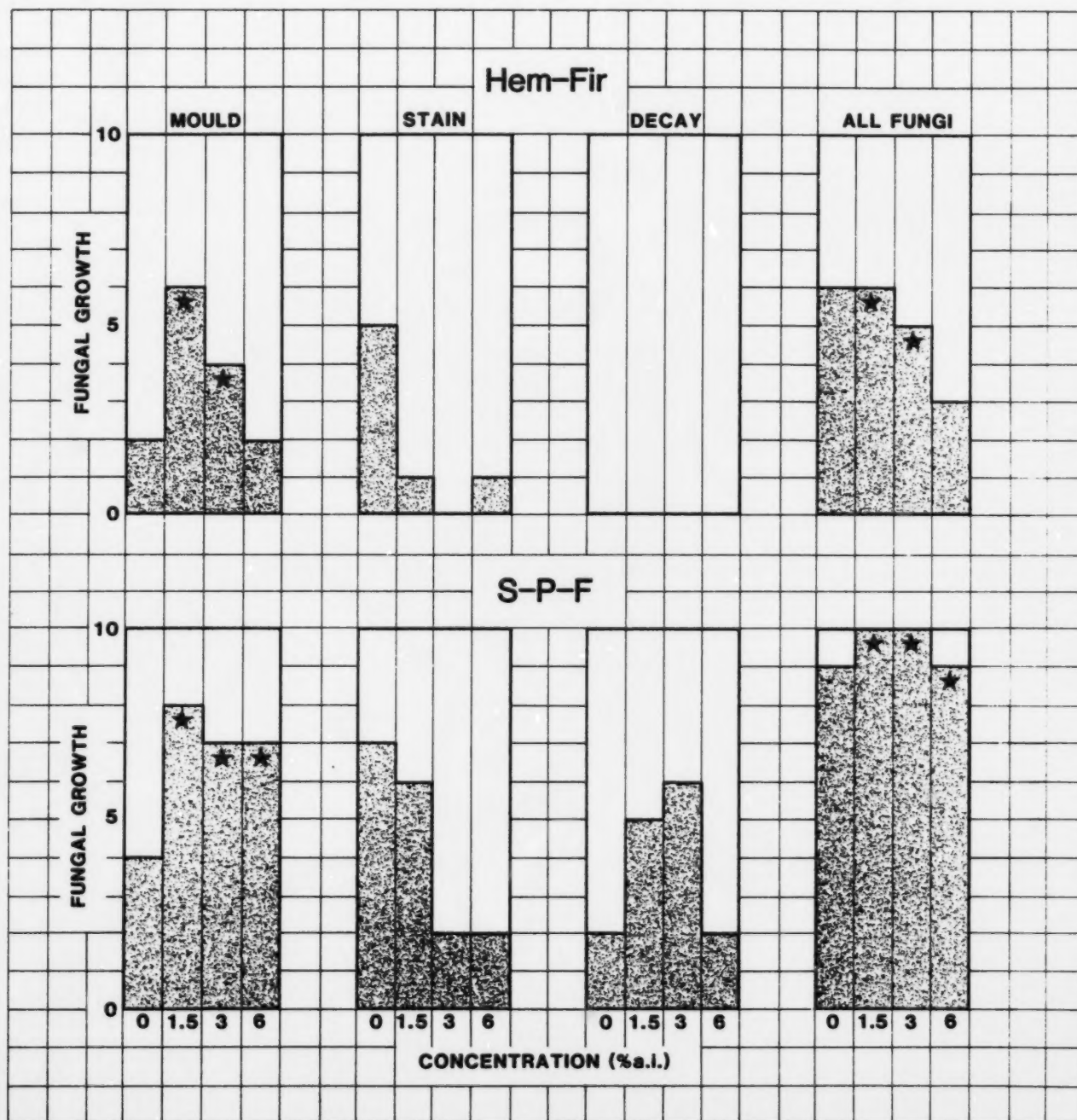
IWD 3822



White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 6. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with
PREVENTOL ON-EXTRA

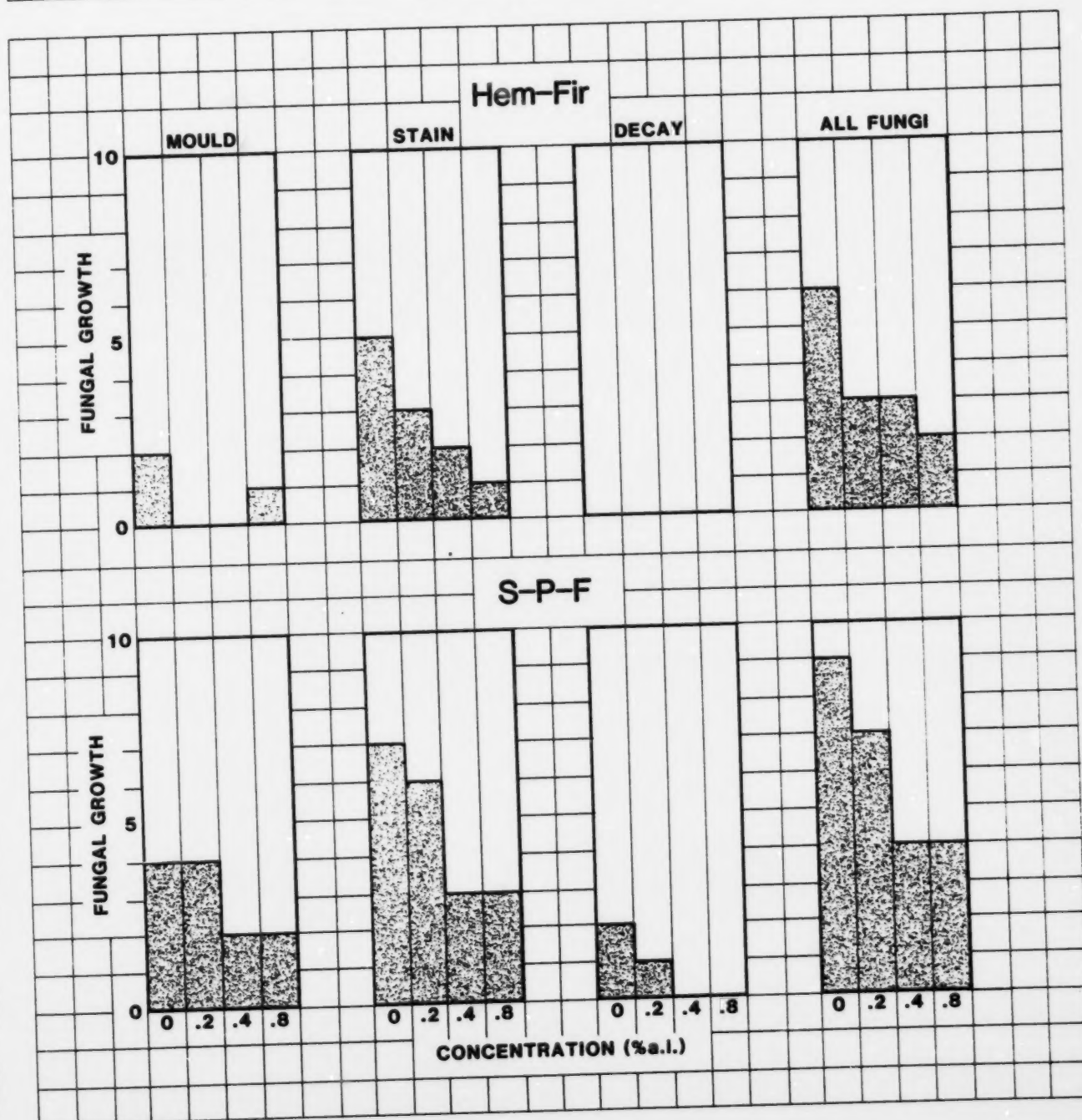


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

★ Moulds were mainly of *Cephalosporium fragrans*.

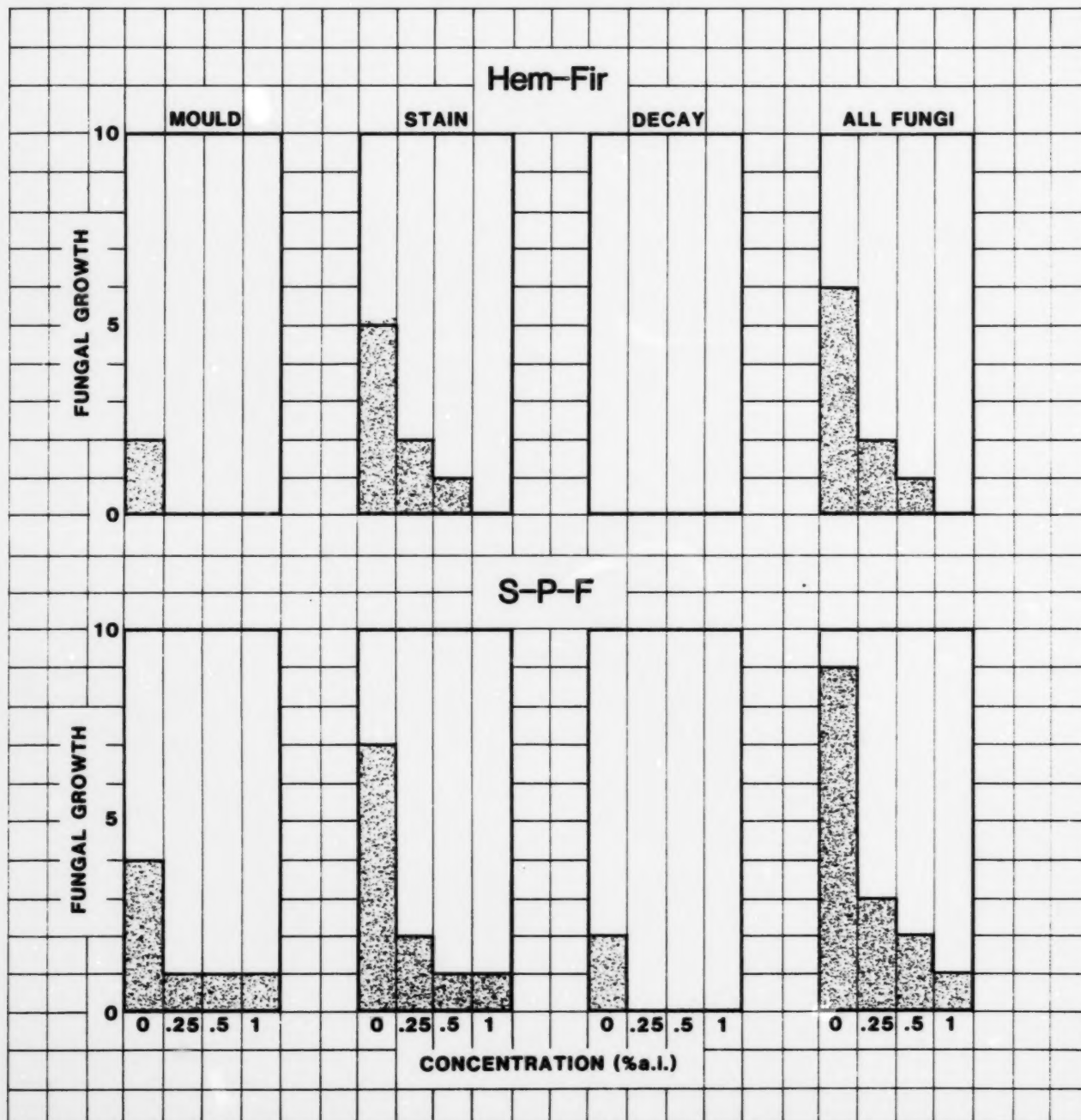
Figure 7. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with
RODEWOOD



White areas on bar charts indicate relative protection.
(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 8. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

SAPTOL 7

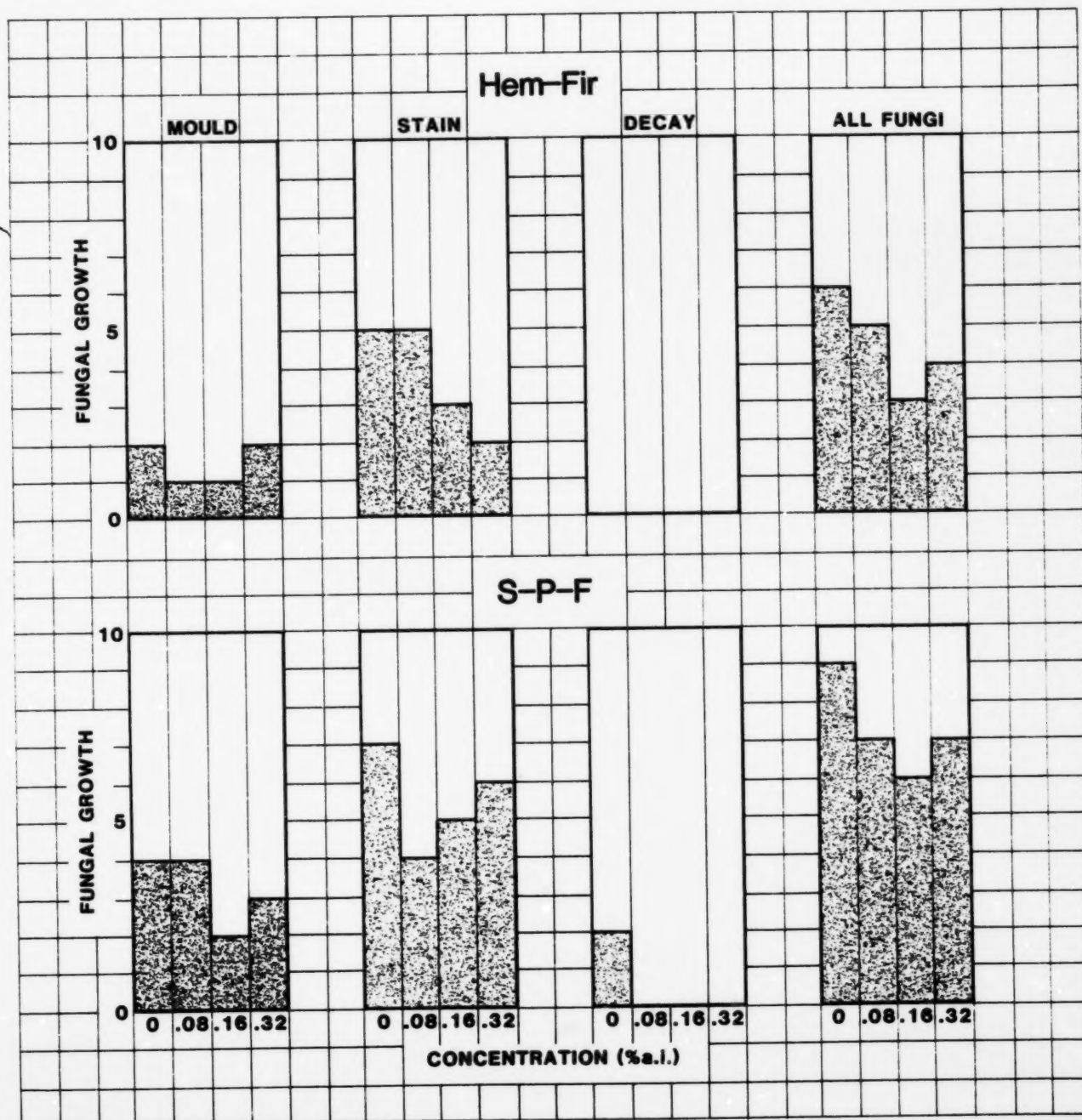


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 9. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

SA 300 WD

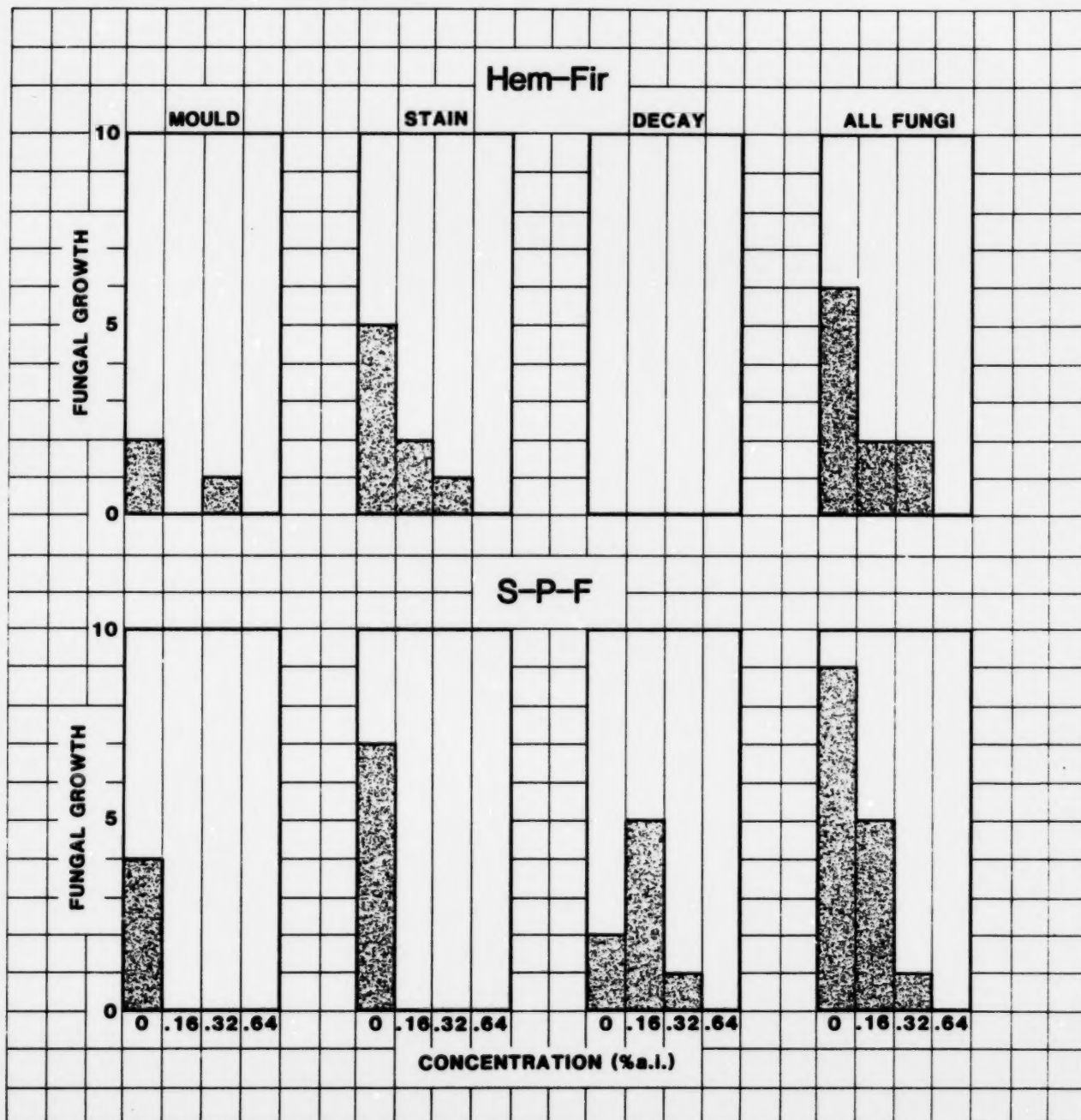


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 10. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

WOODGARD EC

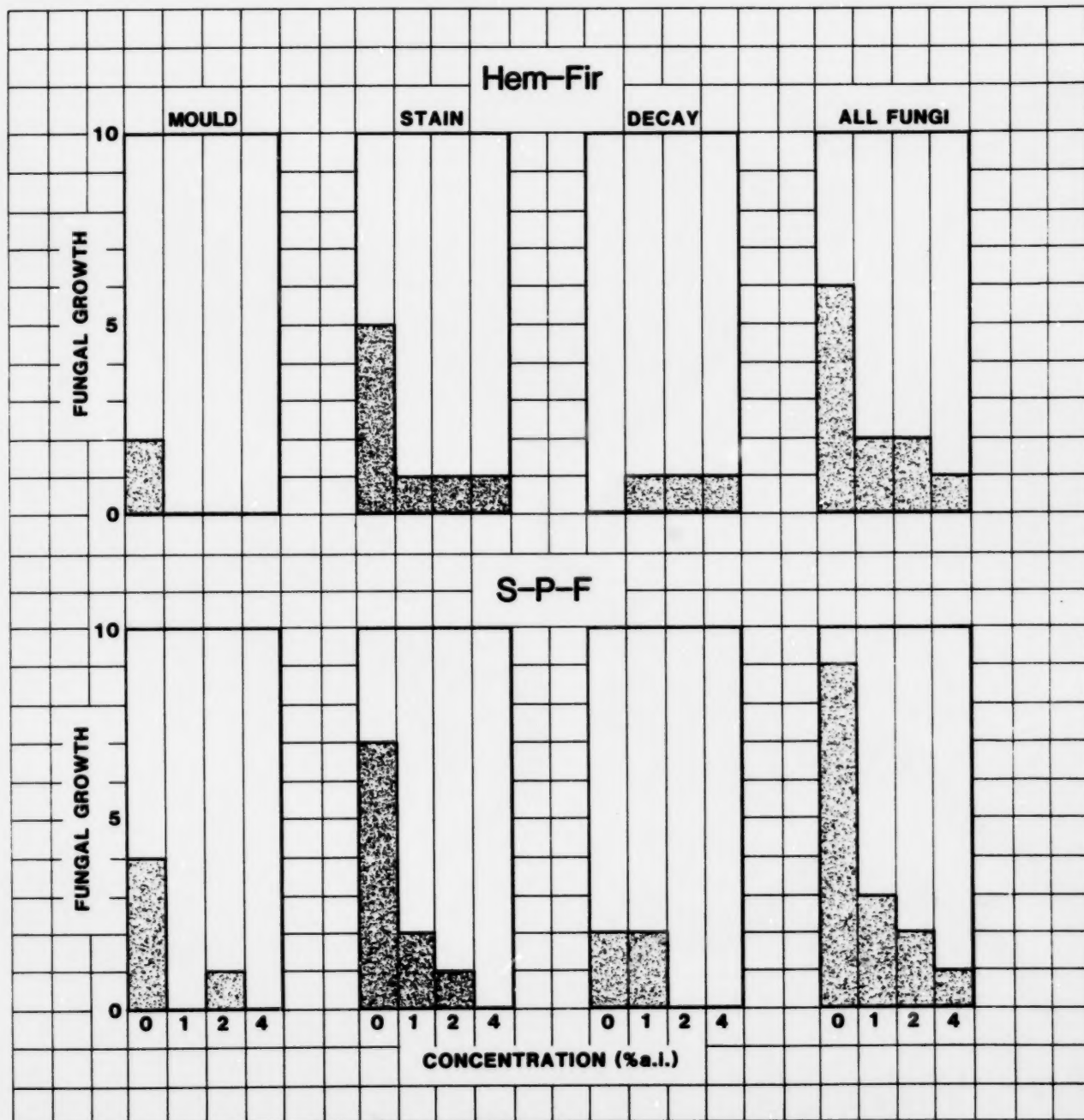


White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

Figure 11. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

EXPERIMENTAL MIXTURE



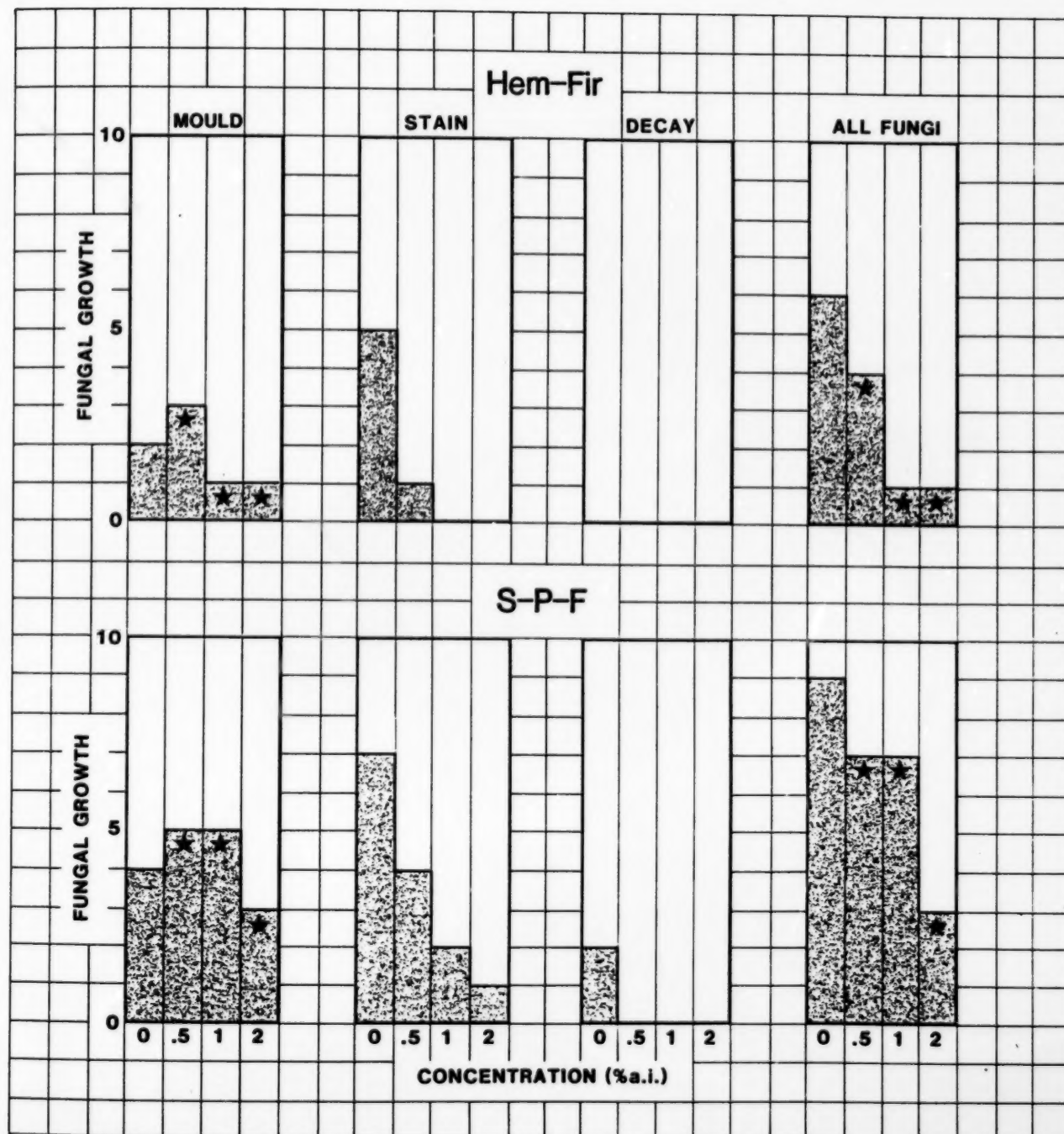
White areas on bar charts indicate relative protection.

(See Figure 12 on the fold out for the results with sodium pentachlorophenate.)

SODIUM PENTACHLOROPHENATE (fold out)

Figure 12. Estimated fungal growth after four months storage on packaged unseasoned lumber treated with

SODIUM PENTACHLOROPHENATE



White areas on bar charts indicate relative protection.

★ Moulds were mainly of *Cephalosporium fragrans*.